SPACE HEATERS

U.S.ARMY

U.S. AIR FORCE

JOINT BASE LEWIS-McCHORD

SERVICE MEMBERS DEFENDING AMERICA

Use of ***Non-Approved*** space heaters is **FORBIDDEN!**

OUTLINE

1. Physiology of a Space Heater
2. What does “approved” mean?
3. “Approved” Space Heaters
4. Carbon Monoxide and Asphyxiation
5. Fire and Fuel Safety
6. PMCS
7. Questions from the field
8. Resources

Physiology of Space Heaters

To fully understand the hazards of a space heater, we need to understand how it works.

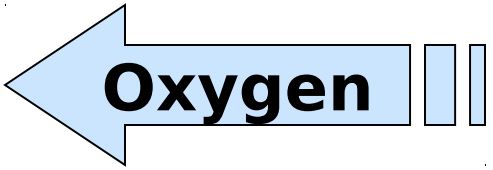
A military space heater uses burning fuel to produce heat for living and working spaces in a field environment.

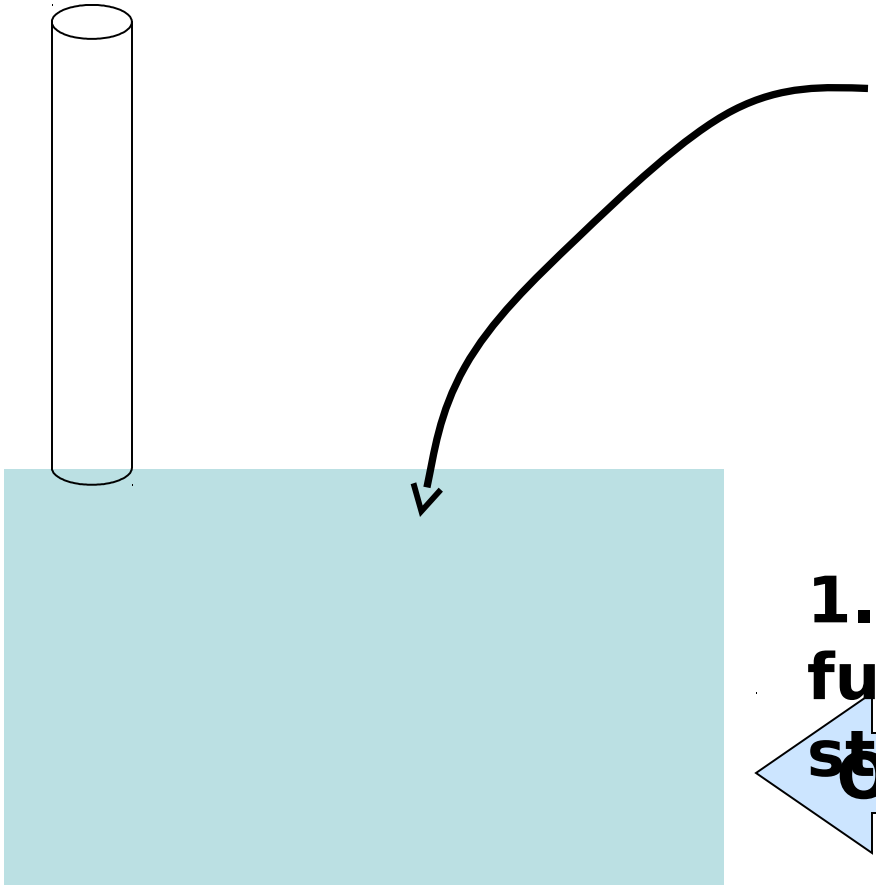
Fuel is introduced into a burn chamber along with fresh air, ignited, and the exhaust is vented away to the exterior of the space being occupied.

Physiology of Space Heaters

As we remember from our 4th grade science class, to make fire, we require 3 things,

- **Fuel,**
- **Oxygen,**
- **Ignition Source**

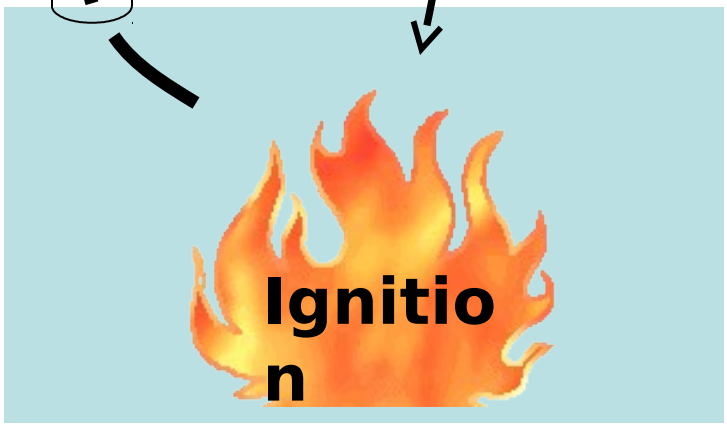




1. Oxygen and fuel enter the stove

Oxygen

Physiology of Space Heaters



1. Oxygen and fuel enter the stove

Oxygen

2. The mixture is ignited and the combustion products (exhaust) is vented away

Physiology of Space Heaters

3. Heat radiates and warms the area

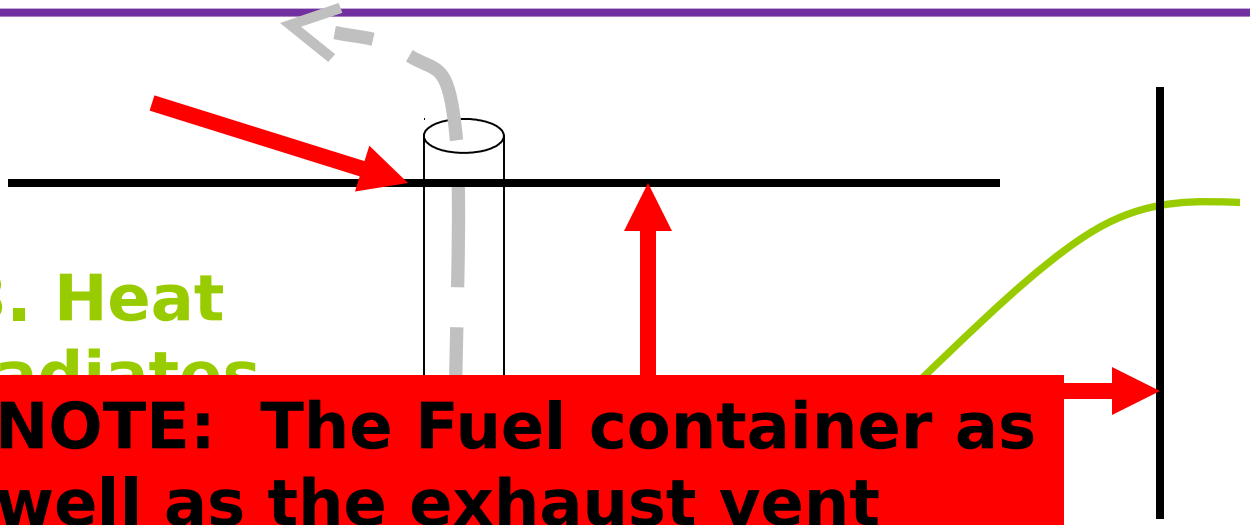
Ignition Source

1. Oxygen and fuel enter the stove

Oxygen

2. The mixture is ignited and the combustion products (exhaust) is vented away

Physiology of Space Heaters



3. Heat radiates a[illegible] t[illegible]

NOTE: The Fuel container as well as the exhaust vent opening must be located outside of the shelter! The exhaust vent opening must also be higher then the shelter roof peak to ensure exhaust is drawn out.

1. Oxygen and fuel enter the stove

Oxygen

2. The mixture is ignited and the exhaust is vented away

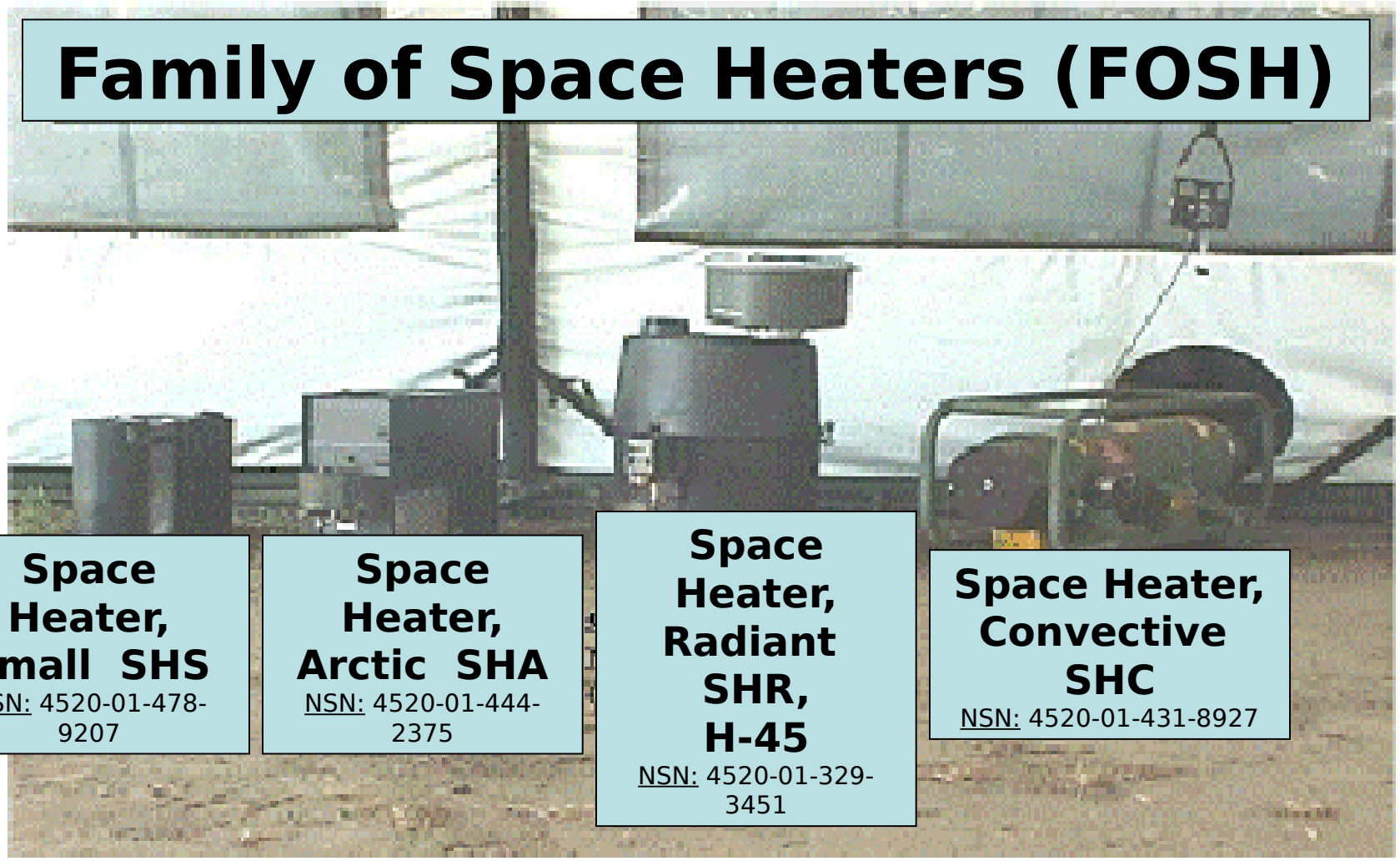
What does “approved” mean?

NEVER HEAT YOUR TENT WITH A COMMERCIAL HEATER. UNVENTED COMMERCIAL KEROSENE HEATERS MAY EMIT DANGEROUS GASES THAT COULD MAKE YOU SICK... OR KILL YOU.
NO COMMERCIAL HEATERS MEET ARMY REQUIREMENTS FOR FIELD ENVIRONMENTS.
WARM YOUR TENT SAFELY AND EFFICIENTLY WITH THESE HEATERS...

1. Un-vented heaters are not authorized for use by any unit in the USAREUR area of operation.
2. Vented commercial off-the-shelf (COTS) and electric heaters may be authorized if they are approved by a reputable national standards organization - Underwriters Laboratories (UL), American National Standards Institute (ANSI), International Standards Organization (ISO)) and are used outside tents and structures.
3. Any space heater belonging to the family of space heaters (FOSH).

Approved Space Heaters

Family of Space Heaters (FOSH)



Space Heater, Small SHS
NSN: 4520-01-478-9207

Space Heater, Arctic SHA
NSN: 4520-01-444-2375

Space Heater, Radiant SHR, H-45
NSN: 4520-01-329-3451

Space Heater, Convective SHC
NSN: 4520-01-431-8927

Approved Space Heaters

Space Heater Small (SHS)

Capabilities: Provides heated air to safely and efficiently warm soldiers operating in basic, cold, and extreme cold environments. Provides new capability for heating smaller tents (4man or less).

Description: SHS is a lightweight, portable, multi-fueled, non-powered heater intended to heat the 4 man Soldier Crew Tent. Provides a maximum heat output of 12K BTU with a high/low adjustment capability. Burns liquid (JP-8, JP-5, DF-1, DF-2, DF-A) fuels. Integral fuel tank eliminates the need for fuel can, fuel can stand, gravity feed adapter, hoses and fittings.

Power requirements: None.
Size: 16”L x 8.5”W X 14”H
Weight: 20 lbs
Cost: $400 (estimated)
NSN: 4520-01-478-9207

Approved Space Heaters

Space Heater Arctic (SHA)

Capabilities: Provides heated air (radiant and natural convective) to safely and efficiently warm soldiers operating in basic, cold, and extreme cold environments. Replaces antiquated, gasoline burning M-50 Yukon Heater.

Description: SHA is a lightweight, portable, multi-fueled, non-powered heater intended to heat five and ten man arctic tents. Provides a maximum heat output of 28K BTU with a high/low adjustment capability. Burns liquid and solid (coal & wood) fuels.

Power requirements: None.

Size: 17”L x 9”W X 17”H

Weight: 41 lbs

Cost: $735

NSN: 4520-01-444-2375

Approved Space Heaters

Space Heater Convective (SHC)

Capabilities: 35K BTU thermoelectric heater provides forced hot air circulation for shelters without the need for a field generator – generates its own power and recharges batteries. Automatic start and temperature control

Description: Delivers clean, breathable heat to e.g., Modular Command Post System, TOCs. Converts waste heat into electrical energy, which is used to power the blowers, pumps, ignition system, safety system, and control devices, and recharges its own starting battery

Power requirements: None.

Size: 40”x14”x18”; 6.1 ft3

Weight: 74 lbs

Cost: $6-8,000 (estimated)

NSN: 4520-01-431-8927

Approved Space Heaters

H-45, Space Heater Radiant, Large (SHR)

Capabilities: Provides heated air to safely and efficiently warm soldiers operating in basic, cold, and extreme cold environments. Replaces antiquated M-41 heater that had severe operational and safety deficiencies.

Description: H-45 space heater is a 45K BTU heater intended to heat the General Purpose and TEMPER tents. Operates without use of electrical power; burns liquid (JP-8, JP-5, JP-4, DF-1, DF-2, DF-A, gasoline) and solid (coal & wood) fuels.

Power Requirements: None.

Size: 18”Dia X 24”H

Weight: 67 lbs

Cost: $500

NSN: 4520-01-329-3451

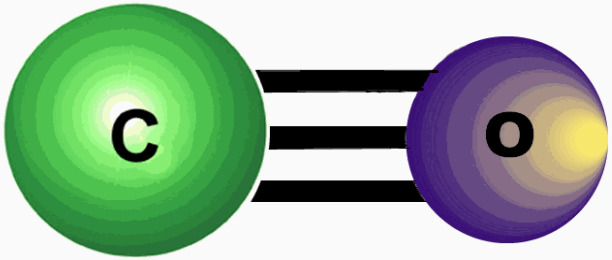
Approved Space Heaters

Thermal Electric Fan (TEF)

Capabilities: Circulates heated air inside all military tents to improve habitability conditions and significantly reduce fuel usage by generating its own electrical power.
Description: TEF is a silent, compact, rugged fan unit placed on top of any military tent heater. A built-in thermoelectric module converts heat from the top surface of heater into electricity to power the

moves heated air
the tent to provide a more even heat
distribution throughout the entire shelte
Power requirements: None.
Size: 14”Dia; 10”H
Weight: 12 lbs
Cost: $500
NSN: 4520-01-457-2790

Carbon Monoxide and Asphyxiation

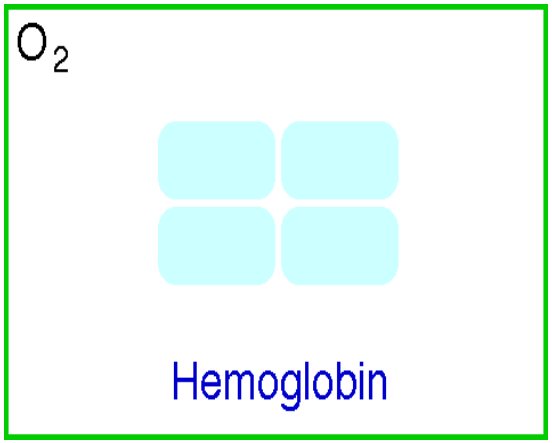


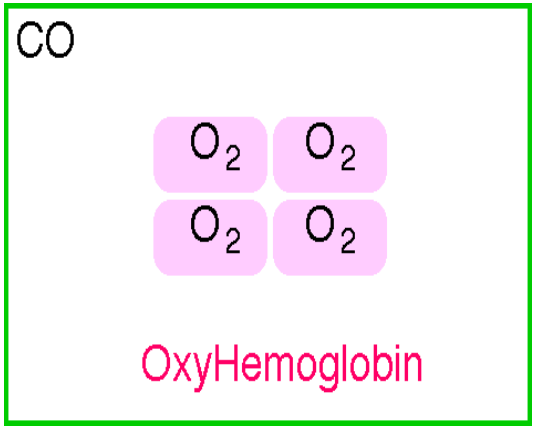
Model of a Carbon Monoxide Molecule.

Carbon Monoxide (known by the chemical symbol CO) is a colorless and practically odorless gas. It is poisonous to people and animals, because it displaces oxygen in the blood. It is produced by the incomplete burning of solid, liquid, and gaseous fuels. Appliances fueled with natural gas, liquefied petroleum (LP gas), oil, kerosene, coal, or wood may produce CO. Burning charcoal produces CO. Running cars produce CO.

Carbon Monoxide and Asphyxiation

Normal oxygenation of the tetrameric (ie. 4 subunits) hemoglobin molecule. As it goes from (deoxy)hemoglobin to oxyhemoglobin the color changes from blue, as in venous blood, then ~~to pink, as in arterial blood~~.

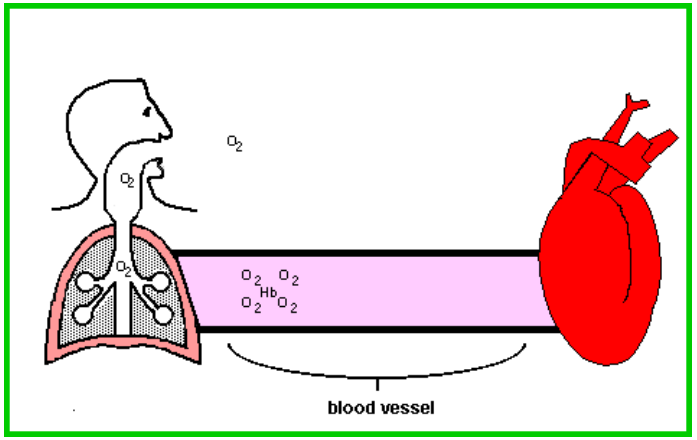


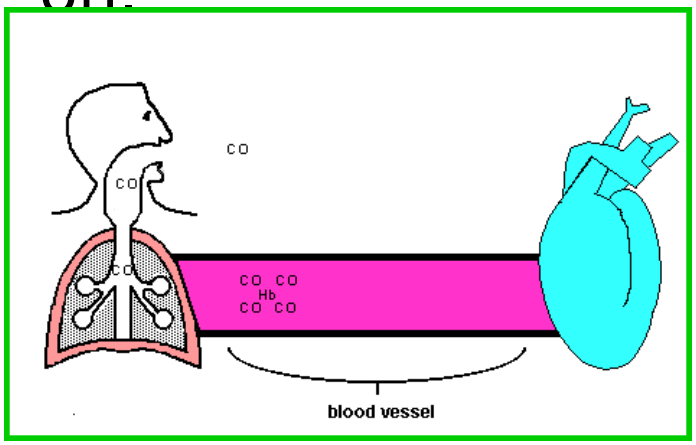


Here carbon monoxide (CO) enters the picture, and through its very high affinity for hemoglobin, displaces the oxygen from the hemoglobin. This prevents oxygen being carried to the tissues and organs of the body. Carboxyhemoglobin is reddish in color.

Carbon Monoxide and Asphyxiation

Oxygen is carried from the lungs by the blood hemoglobin to the tissues, here the beating heart is shown, and normal healthy oxidative metabolism goes on.





During Carbon Monoxide poisoning, CO is carried from the lungs by the blood hemoglobin to the tissues, preventing oxygen from being carried, and blocking normal oxidative metabolism. Note how slowly and weakly the heart is beating, since it is starved for oxygen (i.e.. blue in color).

Carbon Monoxide and Asphyxiation

All of these items "Burn" some type of fuel!

Carbon Monoxide and Asphyxiation

The first **symptom*** of carbon monoxide poisoning is usually a ***tightness across the forehead*****,** followed by ***headache*** and **pounding of the heart**.

A positive **sign*** of progressive carbon monoxide poisoning is if the victim's **face becomes extremely red**. Weariness, dizziness, and mental changes may also occur.

However, if the carbon monoxide is very concentrated, the victim may pass out without feeling any of these symptom.

* A symptom is something YOU feel, a sign is something you SEE.

Carbon Monoxide and Asphyxiation

The following is recommended for victims of carbon monoxide poisoning:

- Remove victim away from contaminated area into fresh air and loosen clothing.
- Give artificial respiration or CPR, as appropriate.
- If oxygen is available, give it to the victim by using a face mask.
- Seek medical attention immediately.
- Keep victim resting.

Carbon Monoxide and Asphyxiation

If the victim was severely exposed to carbon monoxide, symptoms may occur days, or even weeks later, even if the victim at first appears to have fully recovered.

Delayed symptoms include visual defects (blurry vision, or loss of sight), dizzines profound changes in emotions and will power, as well as mental changes (depression).

Fire and Fuel Safety

WARNING!
Fire or Explosion

Do not use unauthorized fuels! Use of unauthorized fuel may result in fire/explosion!

Tent exhaust opening closure flap must be rolled and tied securely. Tent may catch fire if hot stack assembly contacts the flap.

Poorly fitted stack sections may allow the hot stack to fall on tent and start a fire, or deadly carbon monoxide to leak into tent. Ensure sections seat together fully.

Fire and Fuel Safety

WARNING!
Fire or Explosion

Heat or sparks from stack assembly could ignite fuel supply. Set up fuel supply on a clear site seven feet (approx. 2.5 meters) from tent and away from flame sources.

If fuel flow control valve assembly is improperly positioned or if bracket is bent, a fuel overflow could occur inside burner shell and cause a fire or explosion.

Fire and Fuel Safety

WARNING!
Fire or Explosion

For safe operation, be sure to allow at least one (2) feet (61 cm) of space between the heater and the tent wall. Never relight a extinguished flame while the heater is hot. Be sure to allow the heater to cool completely before attempting to relight. Do not attempt to replenish the fuel supply while the heater is in operation. Be certain that there is no open flame in the vicinity of liquid fuel.

Fire and Fuel Safety

WARNING!
Stack Fire Potential

When operating the heater in solid fuel mode (wood), a buildup of creosote can accumulate on the inside surface of the stack assembly that may result in a fire inside the stack. To prevent creosote buildup when operating with solid fuel, the stack assembly should be cleaned daily. Failure to do so may result in a fire causing severe injury or death.

Fire and Fuel Safety

WARNING!

Explosion Potential - Do Not Use Unauthorized Fuels

Gasoline, JP-4, Used Motor Oil, Solvents or other unauthorized fuels should **NOT** be used under any circumstance. **Only approved liquid and solid fuels may be used.** Using unauthorized fuels will create a fire danger and potential for explosion.

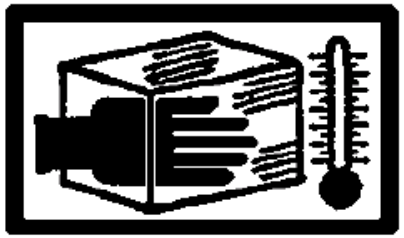
Fire and Fuel Safety

WARNING!
Hot Surfaces

Do not attempt to handle or perform services on a space heater that has recently been in operation.

Let the space heater cool down before performing these procedures to avoid the possibility of serious burns.

Fire and Fuel Safety



WARNING!
Freeze Hazard

Severe injury may occur to personnel handling metal parts without protective gloves when temperatures are below freezing. Skin may freeze upon contact and tear from the flesh.

Do not allow fuel to come in contact with bare skin. Even though fuel does not freeze, it is extremely cold and will burn exposed skin on contact. Wear protective gloves whenever handling or working with liquid fuel.

Preventive Maintenance Checks & Services

As with all equipment, *By-The-Book* PMCS is necessary to maintain your space heater in a high state of safe and ready C-1 operational status.

TM 10-4520-261-12&P

SPACE HEATER ARCTIC (SHA)
PREVENTIVE MAINTENANCE CHECK AND SERVICES (PMCS) **0010 00**

THIS SECTION COVERS:
Before Operation PMCS Checks and Services

INITIAL SETUP:
SHA Shutdown and Cool

Maintenance Level	**Materials**
Operator	Wiping Rags (WP0046, Table 1, Item 1)

Preventive Maintenance Checks & Services

Maintenance Level

Operator

Any idea who this is?

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
6	Before	Fuel flow control valve	Check for bent/damaged bracket **(3)**, fuel flow control valve **(4)**, cup/cable assembly **(5)**. Be sure bracket **(3)** is not bent out of the required 90 degree position from the heater body assembly **(6)**.	Valve is damaged or valve bracket bent out of 90 degree position with heater body.

Before really does mean BEFORE!

Preventive Maintenance Checks & Services

All metal heater components should be wiped down with a rag dampened with a light machine oil or WD-40 before storage or after cleaning to prevent rust.

Proper cleaning is an integral part of maintenance. It will help prevent possible problems in the future, so make it a habit to clean your space heaters whenever necessary.
The heater frame interior can be cleaned with a rag; the exterior can be cleaned with a brush. Wipe down
all hoses with a rag. Make sure that all connectors are free of debris and that they work freely.

Questions from the field

QUESTION: I have a 6 man crew tent (LIN T50975) and have been ordered to find a non Yukon heater to heat it....what is the right answer????

ANSWER: The Heater you need is Space Heater Artic NSN 4520-01-444-2375.

Questions from the field

QUESTION: Trying to locate the TM number for space radiant heater NSN 4520-00-540-0557

ANSWER: The TM for space heater, NSN 4520-00-540-0557 is TM 5-4520-235-13. This TM can be accessed at our ETM website. Since the TM is public release, the only thing required is the correct software.

http://www.logsa.army.mil/

Questions from the field

QUESTION: What is the standard heater for the Army Crew tent????

ANSWER: For the Soldier Crew Tent you should use the Space Heater Small, NSN: 4520-01-478-9207. The dimensions are 16” L x 9” W x 14” H and its 32 lbs with 12,000 BTUH. The cost is $600 including all accessories. It is designed to provide heat for the Soldier Crew Tent (5-man tent) and other small tentage with floor area between 80 and 100 square feet. Operates without the use of electrical power and can burn all types of liquid fuel (DF-2, DF-1, DF-A, JP-5, JP-8).

Questions from the field

QUESTION: we need the NSN for these kerosene heaters, Corona portable kerosene heater 23-dk. we have no other info on them, and our cg is demanding we get rid of these heater.

ANSWER: Sir, we cannot identify the heater as described as above. Un-vented Kerosene heaters, as a general rule are not authorized for use.

Questions from the field

QUESTION: I know it is common knowledge not to use metal fuel cans with our Heater, Space, Radiant, Large, tent stoves, but we are in a jam because we only have plastic cans. The plastic cans are not sealing right. My question is, can we use metal cans and if we can't, where can I get that in writing?

ANSWER: TB 43-PS-539, page 49 says that as of 1 Oct 96 only plastic fuel cans are authorized according to United Nations and Department of Transportation rules. There are two 5-gal plastic cans available, sand colored NSN 7240-01-337-5268, and olive drab colored NSN 7240-01-337-5269.

Questions from the field

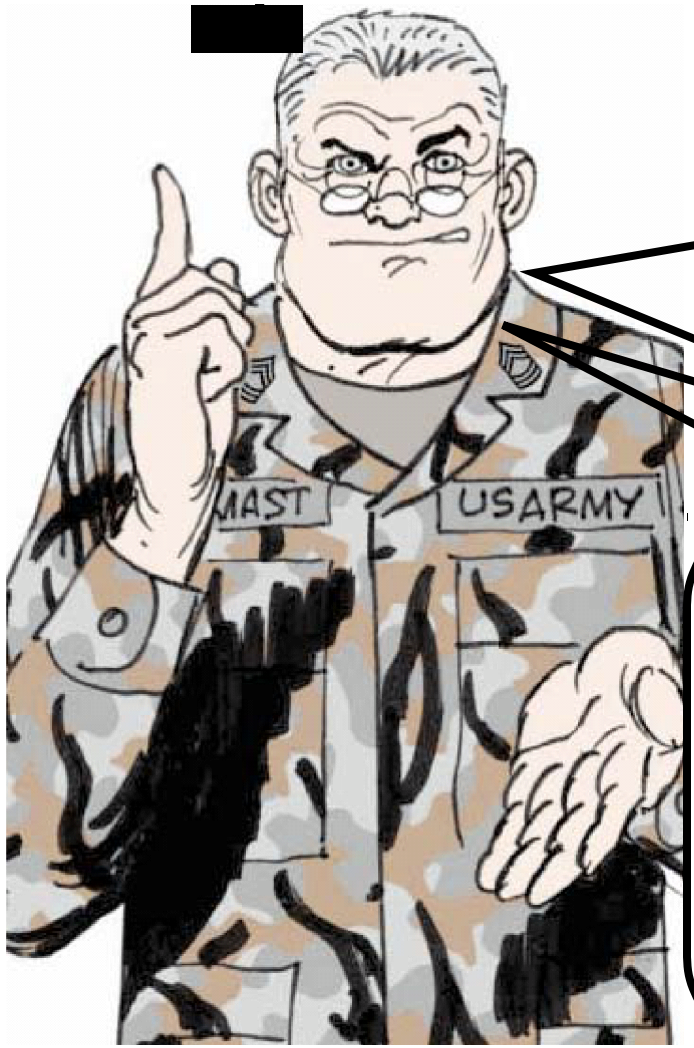
QUESTION: Need info on Heater, Space NSN 4520-00-927-4214. Is this heater safe to use. I know it has been replaced by a different stock number (3451).

ANSWER: That NSN has been replaced by 4520-01-329-3451. The old heater is very dangerous in use, the prime fuel to be used is MOGAS, it will run on JP8 but very poorly. The unit shoul
01-329-34
in FEDLOG

Questions from the field

QUESTION: My platoon sergeant told me I cold not operate my space heater until I completed the proper training, is this true? After all, it's just a heater!

Questions from the field

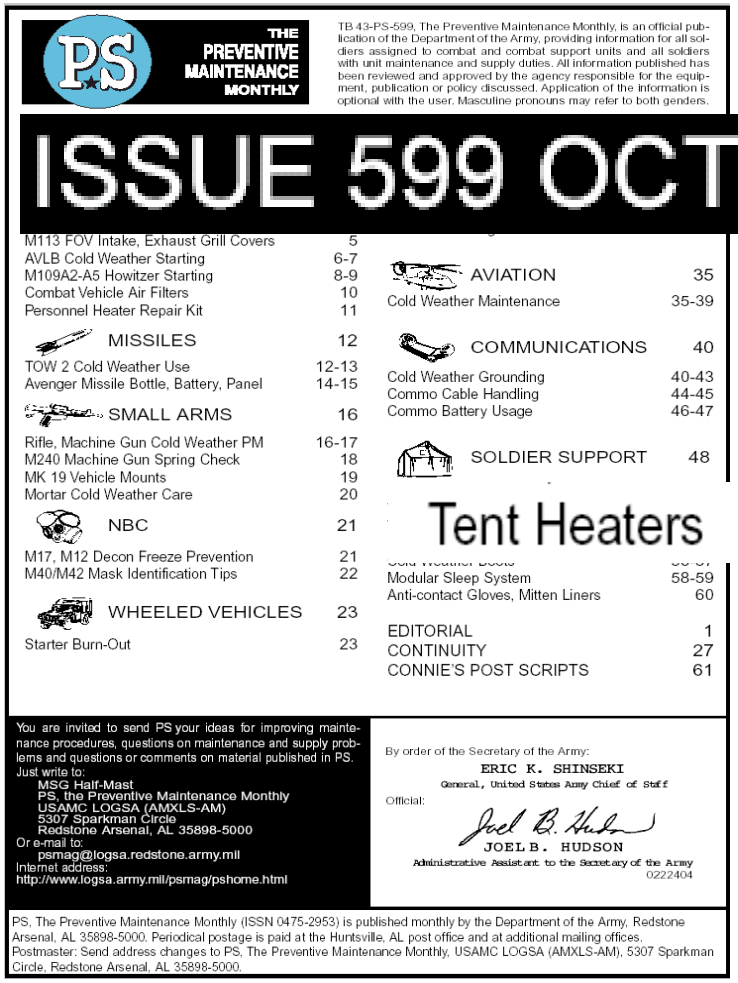


Your platoon sergeant is one smart cookie! Every piece of equipment in the army inventory has the potential, if used without knowing the hazards, to kill or injure.

ANSWER: Not only is it common sense, but training is required by regulation. AE Pam 385-15, section 35 assists commanders in implementing safety guidance for use and training of space heaters

Resources

http://www.logsa.army.mil/pub/psissues/PS_599.pdf



THE PREVENTIVE MAINTENANCE MONTHLY

TB 43-PS-599, The Preventive Maintenance Monthly, is an official publication of the Department of the Army, providing information for all soldiers assigned to combat and combat support units and all soldiers with unit maintenance and supply duties. All information published has been reviewed and approved by the agency responsible for the equipment, publication or policy discussed. Application of the information is optional with the user. Masculine pronouns may refer to both genders.

ISSUE 599 OCTOBER 2002

M113 FOV Intake, Exhaust Grill Covers 5
AVLB Cold Weather Starting 6-7
M109A2-A5 Howitzer Starting 8-9
Combat Vehicle Air Filters 10
Personnel Heater Repair Kit 11

MISSILES 12
TOW 2 Cold Weather Use 12-13
Avenger Missile Bottle, Battery, Panel 14-15

SMALL ARMS 16
Rifle, Machine Gun Cold Weather PM 16-17
M240 Machine Gun Spring Check 18
MK 19 Vehicle Mounts 19
Mortar Cold Weather Care 20

NBC 21
M17, M12 Decon Freeze Prevention 21
M40/M42 Mask Identification Tips 22

WHEELED VEHICLES 23
Starter Burn-Out 23

AVIATION 35
Cold Weather Maintenance 35-39

COMMUNICATIONS 40
Cold Weather Grounding 40-43
Commo Cable Handling 44-45
Commo Battery Usage 46-47

SOLDIER SUPPORT 48
Tent Heaters 50-51
Modular Sleep System 58-59
Anti-contact Gloves, Mitten Liners 60

EDITORIAL 1
CONTINUITY 27
CONNIE'S POST SCRIPTS 61

You are invited to send PS your ideas for improving maintenance procedures, questions on maintenance and supply problems and questions or comments on material published in PS.
Just write to:
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USAMC LOGSA (AMXLS-AM)
5307 Sparkman Circle
Redstone Arsenal, AL 35898-5000
Or e-mail to:
psmag@logsa.redstone.army.mil
Internet address:
http://www.logsa.army.mil/psmag/pshome.html

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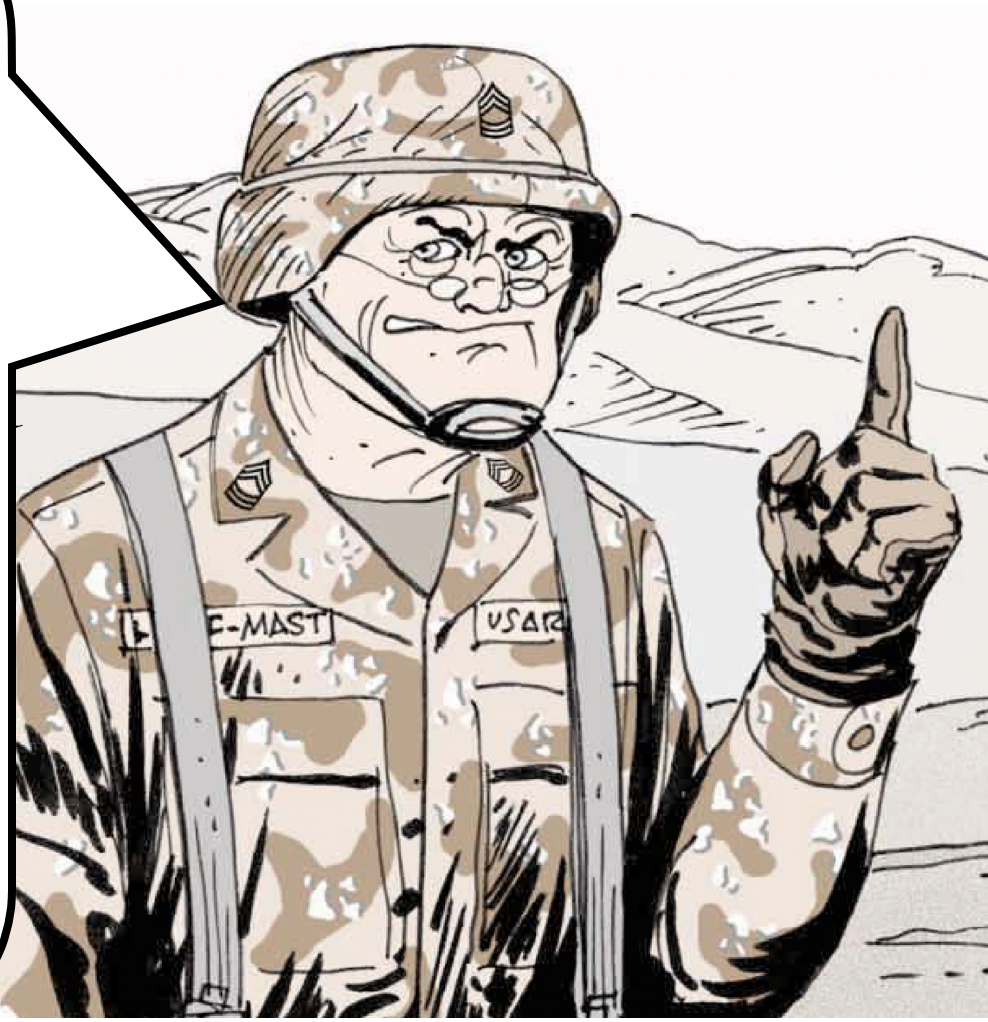
PS Magazine

It's *your* resource

Use It!

Look in these publications for more information

- AE Pam 385-15 Leader's Operational Accident Prevention Guide
- TM 10-4520-261-12&P Space Heater Arctic
- TM 10-4520-263-12&P Space Heater Small
- TM 9-4520-257-12&P Space Heater Radiant Large
- TM 10-4520-262-12&P



Resources

For More Information

Contact your Unit Safety Officer/NCO

Or

The Fort Lewis Safety Office

Valuable information located at these websites:

https://ft.lewis.army.mil/safety/index.htm

http://www.logsa.army.mil/

PS Magazine Home Page